International Journal of Educational Science and Research (IJESR)
ISSN(P): 2249-6947; ISSN(E): 2249-8052
Vol. 4, Issue 2, Apr 2014, 1-8

"USING PICTURE COMMUNICATION SYMBOLS (PCS) FOR TEACHING TO READ AND WRITE CHILDREN WITH DOWN'S SYNDROME"

VANESSA TATIANA BADILLO JIMÉNEZ
Research Scholar, Barranquilla, Colombia

ABSTRACT

The main aim of this study was to assess the impact of the PCS- method (Picture Communication Symbols) on the ability to learn, to read, to write in children with down's syndrome and to document the development of writing levels. For this purpose 24 colombian school children with down's syndrome from the region boyacá (central colombia) were divided in two groups of 12 children each in separate classes: the pcs- intervention group and the control group. The study period was ten months. The children were tested on level of cognitive and communication development before and after the program. Both groups received the same school program; the only difference between intervention and control group was the use of the pcs-system. The central hypothesis of this study was that the intervention group would show much better and statistically significant results in language development after ten months compared with children of the control group. The results indicated that the children of the intervention group showed indeed better results in most dimensions of language development and significantly results. The use of the pcs- system facilitated children to read and write at much higher levels.

KEYWORDS: Children, Down Syndrome, Reading, Writing, Learning

INTRODUCTION

Children with Down's syndrome have difficulties in the acquisition of the phonological awareness (Cossu et al., 1993; Bertelson, 1993; Ryka, 1994; Iacono, 1998). However, many studies report that children with Down syndrome learn the ability to read and write for concrete situations in their own live. (Troncoso & Del Cerro, 1991; Bower & Hayes, 1993; Buckley & Bird, 1993; Bird et al., 2001; Oelwein, 1998; Buckley, 2001; Byrne et al., 2002; Henao et al., 2003; Baddely & Wilson, 1995; Cossu, Rossini & Marshall, 1993; Byrne, 1993; Morton & Frith, 1993; Burt, Holm & Dodd 1999; Bird, Bishop & Freeman, 1995; Byrne & Fielding-Barnsley, 1991; Byrne & Fielding-Barnsley, 1993; Guillon, 2000; Gathercole & Baddeley, 1990; Seymour & Elder, 1986; Bishop & Robson, 1989; Bishop & Adams, 1990; Morais, Cary, Alegria & Bertelson, 1979; Sterne & Goswami, 2000).

The purpose of this paper is to explore the impact of the PCS- method (Picture Communication symbols) on the ability to learn, to read, to write in children with Down's syndrome and to document the development of writing levels. Another purpose was to document the impact that parents have in the process for learning to read and write of this children.

Importance of Alphabetical Literacy in a Society Like Ours

The ability to read and write is today a fundamental competence to be able to function independently in a global society in which we live. Ferreiro (1996, 28) argues that among illiterate people is further developed, one labeled "technological illiteracy", much more complicated is the situation for people who suffer from a cognitive deficit, sensory or physical.

The development of literacy can be understood from different perspectives. There are authors like (Coltheart et al., 1993, Liberman et al., 1974) who doubt that the child goes through a series of steps to acquire the literacy symbol. There is another group (Ferreiro and Teberosky, 1982; Jimenez Rodrigo Hernandez, 1999) in Spanish; Ehri (1986), Frith (1985), Gentry (1982) and Henderson (1985) in English; Brügelmann (1983), Günther (1989); Schereer - Neuman (1990b) and Valtin (1993) in German language, who involves the acquisition of reading and writing symbol through a series of specific steps, which are described below:

- **Preliteral-Symbolic Phase:** be characterized by the development of the symbolic function, the child begins to recognize words and short sentences. The child begins to understand that writing is different from the signs that letters represent more than points and lines.
- **Logo- Graphic Phase:** In this phase the child acquires the ability to recognize words of everyday life, where the key is that the child does not recognize the words and phonological factors of a word, but I find the meaning of the written symbol. That is, here the children understand that a logo in Nivea cream container is associated with the cream.
- **Alphabetic Phase:** This phase is characterized by the relationship between graphemes and phonemes begin to uncover the child. That is, the child begins to learn the order of the consonants and phonological factors, when it can begin to read and write unfamiliar words. Ultimately, the child begins to be aware of the relationship between written and spoken language.
- **Spelling Phase:** Here the child is able to recognize and assimilate a sequence of words, ie, the child recognizes the different phonemes, which is composed in a word, is able to analyze the difference and order between graphemes and phonemes a word.
- **Integrative-Automatically Phase:** The child here is able to read and write words and sentences automatically. Already the child internalized grammatical rules, syntactic and pragmatic language, could understand jokes, double or diversity of meanings and ironies.

In short we can say that the literacy process is an activity which is based on written and spelling systems, within which exists in part a type of interdependence. Therefore it is necessary that the school is taught alongside reading and writing.

PCS Symbols and their Relationship between the Literacy Processes

The PCS (Picture Communication Symbols) is a system of symbols that belong to the Alternative and Augmentative Communication (AAC). Augmentative and Alternative Communication is an Anglo-Saxon term refers to the use of methods that increase or replace communication skills through verbal language in a person who does or has any restriction on the development of speech (Gangkofer, 1993). The AAC provides people with some kind of limitation on speech the possibility of a meaningful expression.

Conners (1992); Vandervelden & Siegel (1999), Ford & Silber (1994); Bristow & Fristoe (1984); Mirenda & Locke (1990); Orlansky & Bonvillian (1984), Wilkinson & Sevcik, Romsky (1994); Heimann, Nelson, Tjus & Gillberg (1995); Light, Roberts, DiMarco & Greiner (1998), Walker (2001); Dahlgren & Hjelmquist (1996); Light & Kelford Binger (1994); Janice & Kelford (1993), Powell (2001), Foreman & Crews (1998), Danielsson, Rönnberg & Andersson (2006) and Harris & Reichle (2004) and others have shown that through the use of augmentative

and alternative communication are improved communication skills both receptive as expressive of people with limitations in language and/or speech, which leads as a result that facilitates the integration of this population.

Phonological Awareness and its Relationship with the Literacy Learning

Since the 70s it starts to establish the relationship between 'phonological awareness' and 'Early Reading' (vgl. Stahl & Murray, 1994:221). Some researchers have taken the view that the development of phonological awareness is a prerequisite for the start of reading (Coltheart, Curtis, Atkins & Haller, 1993; Liberman, Shankweiler, Fisher & Carter, 1974; Liberman & Shankweiler, 1977). Other authors, however, maintained the position that literacy learning is a sequence of stages or phases through which the child must traverse, and that it has developed not necessarily the acquisition of phonological awareness for learning to read and writing (Frith, 1985; Ferreiro & Teberosky, 1982; Jiménez, Rodrigo, Hernandez, 1999; Brügelmann, 1986; Günther, 1989; Schereer - Neuman, Valtin, 1993).

Snowling & Hulme (1994:24) describe the development of phonological awareness and define this term as follows: „Phonological development refers to the process by which children acquire and use the sound patterns of their native language in communication. Phonological awareness refers to the ability to reflect upon the sound structure of spoken words. It is a metalinguistic skill that emerges relatively late, once much of the child's language development is complete". Furthermore, the term refers to 'phonological awareness', to the ability to retain, develop, process and store the information in a symbolic structure through oral language structure (vgl. Oakhill & Kyle, 2000:152). The child learner must understand that the meaningful content of a language consists of sentences consist of words, words turn syllables and syllables composed of graphemes and sounds. In essence, it must distinguish two aspects: the Phonological Awareness is the ability to understand and differentiate that words are composed of syllables and syllables turn up different words. That is, phonological awareness involves the ability to recognize each and every one of the graphemes and phonemes within words and know them apart in the position where they are. And this is a development to be achieved by the child for the acquisition of literacy (vgl. Liberman, Shankweiler, Fischer & Carter, 1974; Mann & Liberman, 1984; Major & Handford, 1998, Burgess & Lonigan, 1998 and Yoop & Yoop, 2000).

Alphabetic languages are built on the assumption of the acquisition of phonological awareness (vgl. Liberman et al., 1974:202; Vellutino, Scanlon & Spearing, 1995:77). For the development of phonological awareness is necessary that the child to develop the 'cognitive ability`, `the short-term memory` and `speech perception' (Liberman vgl. et al., 1974; Coltheart, Curtis, Atkins & Haller, 1993; and MacBride-Chang, 1995). However, there are a variety of studies that show that even if there is a deficit in cognitive development, storage of information in short term memory or a delay in the development of verbal language, it is possible to acquire the literacy process. Children who develop any of these types of deficits, as in the case of mentally retarded children with mild to moderate everyday have reached a level in the acquisition of reading and writing for their development (Baddely & Wilson, 1995; Cossu, Rossini & Marshall, 1993, Byrne, 1993; Morton & Frith, 1993; Burt, Holm & Dodd 1999; Bird, Bishop & Freeman, 1995; Byrne & Fielding-Barnsley, 1991; Byrne & Fielding-Barnsley, 1993; Guillon, 2000; Gathercole & Baddeley, 1990; Seymour & Elder, 1986; Bishop & Robson, 1989, Bishop & Adams, 1990; Morais, Cary, Joy & Bertelson Goswami & Sterne 1979, 2000).

METHOD

Participants

In this study participated twenty four children with Down syndrome (Trisomy 21): eight females and sixteen males, they were Colombian school children from the Region Boyacá (central Colombia). The children were aged between 6 years and 12 years old. They were selected on the basis of a Down syndrome diagnostic, on the basis of IQ between

45 and 70, on the basis of speech of two or more words and on the basis that the children the ability to difference for listening information. Assessments on the WISC-RM, Wechsler Intelligence scale for children, (Gómez Palacio, Padilla, & Roll, 1983) were conducted all children and indicated that twelve children had an IQ between 49 and 55, and eleven had an IQ between 57 and 66.

Information on the subject's productive language was obtained from the assessment on the FACILITO- test.

Procedures

All children who participated in this research became permission of their parents to take part in this study. The parents were participated at the program too. All procedures were in a classroom for the central school each zone. At the beginning for this study became each child individually the WISC-RM test and then the FACILITO- test. The FACILITO- Test was two times administered, for the beginning and at the end of this process.

It was administered each child the WISC-RM test only at the beginning this study. Then would be the FACILITO-test administered. All children became the pedagogical intervention five times a week for four hours, including thirty minutes pause. The parents of the children participated once a months in a workshop. The aim of the workshop was that the parents the development of their children learned and that the parents of the intervention group the process support.

CONCLUSIONS

The results of this research showed that learning literacy in children with mild to moderate mental retardation can be facilitated by using PCS pictographic symbols. The reading skills are closely connected with writing skills, such as long memory and short-term, cognitive development, levels of attention and concentration (Byrne, Buckley, MacDonald & Bird, 1995; Buckley, 2001; Del Cerro, 1991; Henao, Ramirez & Giraldo, 2003). And so effectively demonstrated statistical results with respect to the first hypothesis, the intervention group obtained a relevant difference of 34 % in their favor compared to the control group.

Although this research came to results that indeed all the children involved in this study achievements made during the intervention process, the use of pictograms PCS was support or relevant results. Especially, in the aspects of "repetition of phrases", "visual differentiation of words and symbols", "speaking", "graphic expression" and "line drawing".

Regarding visual perception show children with Down syndrome with mild or moderate mental retardation very good optical retention (Buckley, 1993; Bird, Beadman, 2001; Oelwein, 1998 and Hainaut, 2003), that is the reason why they are given to recognize letters and form words in the initial learning of literacy. In this investigation it was found that children respond very well to visual stimuli and for this reason do well with PCS pictographic symbols, because these transparent in its structure. That meant that the use of pictograms stimulated visual memory, being one of the recurrent variable for literacy.

Another result to that reached in this study is that indeed the use of pictograms stimulated processes of concentration and short term memory. The percentages of improvement were higher in the intervention group than in the control group. Furthermore, the ability to communicate both expressive language and receptive children in the intervention group has significantly increased in the control group. Although children with mild to moderate mental retardation have difficult in the attention process (Rondal, 1995), this study showed that indeed the use of pictograms helps improve these processes. The use of symbols as a teaching aid potentiated the attention levels in children. Children and adolescents with Down syndrome (mild or moderate mental retardation) have problems in short term memory (Buckley & Bird, 1993;

Broadley & MacDonald, 1993; Jarrold, Baddeley & Phillips, 1999; Bower & Hayes, 1993; Marcell & Weeks, 1988; Conners, Rosenquist & Taylor, 2001). However, the results of this research showed that children of the intervention group improved their skills in this area. The use of pictograms allowed the children in the intervention group maintained greater visual information in memory, and this of course later facilitated the acquisition of literacy. This same aspect facilitated them understand the relationship between signifier and signified of a word which allowed them to improve their skills in their receptive and expressive language.

Although, children in the intervention group showed better results it should be noted that children in both groups who were younger recorded better results and this is clearly evident in the results obtained. Also documented in the literature that the earlier intervention begins, you will get better results in learning processes (Buckley & Mitarbeiter, 1986; Kroeger & Nelson, 2006; Oelwein, 1998; Wilken, 1997; Halder, 1996). It is known that early intervention in children with mental retardation, mild or moderate improve their communication skills (Buckley et al., 1986; Byrne, MacDonald & Buckley, 2002). Also, children with Down syndrome (with mild or moderate mental retardation) learn best visually and in some cases written language first they learn verbal language (Byrne, Buckley, MacDonald and Bird, 1995). From there it is concluded that the use of pictograms (PCS) becomes a suitable teaching method for teaching literacy in children with mild to moderate mental retardation. By implementing PCS symbols simultaneously stimulates short-term memory, visual memory and both receptive and expressive language. It was found that the teaching method of the pictograms have positive effect on the acquisition of the literacy symbol.

During the study found that variables like 'chronological age', 'Intelligence Quotient', 'Family Status' and 'Environment preschool' influenced the literacy learning in children with mild and moderate mental retardation. Overall, children showed better results in both groups who had parents with an academic degree, and the commitment of these parents during the process was higher than that of the parents who had attained only primary education. The inclusion of parents is an important factor in the literacy learning and acquisition of communication skills of their children.

The implementation of pictograms (in this case PCS symbols) is an educational tool for teaching literacy process in children with mild to moderate mental retardation. The performance and the statistical results of the intervention group in terms of literacy instrumental prerequisites were markedly higher after the intervention compared with control children. Additionally, children of the intervention group reached reach alphabetic phase. Pictograms became a mediator to teach between signifier and signified representation of a word, so that for children was relevant and meaningful literacy process in their daily lives. The use of pictograms PCS stimulates the symbolic function of language. The implementation of pictographic symbols facilitated the acquisition of the skills of the pre literal symbolic phase to the alphabetic phase.

REFERENCES

1. Bertelson, P. (1993): *Reading acquisition and phonemic awareness testing: how conclusive are data from Down's syndrome?* (Remarks on Cossu, Rossini and Marshall, 1993). In: *Cognition,* 48, 281 – 283.
2. Bird, G.; Beadman, J. & Buckley, S. (2001): *Reading and writing development for children with Down syndrome (5-11 years).* The Down syndrome Educational Trust, Hampshire, United Kingdom.
3. Bower, A. & Hayes, A. (1993): *Short-term memory deficits and Down's syndrome: a comparative study*. In: *Down syndrome Research and Practice* 2 (2), 47-50.

4. Broadley, I.; Buckley, S. & MacDonald, J. (1994): *Are children with Down's syndrome able to maintain skills learned from a short-term memory training programme?* In: *Down syndrome Research and Practice* 2 (3), 116-122.

5. Broadley, I. & MacDonald, J. (1993): *Teaching short-term memory skills to children with Down's syndrome*. In: *Down syndrome Research and Practice* 1 (2), 56-62.

6. Broadley, I., MacDonald, & J. Buckley, S. (1995): *Working memory in children with Down's syndrome.* In: *Down syndrome Research and Practice* 3 (1), 3-8.

7. Buckley, S. (1993a): *Language development in children with Down's syndrome: reasons for optimism*. In: *Down-Syndrome Research and Practice* 1 (1), 3-9.

8. Buckley, S. (1993b): *Developing the speech and language skills of teenagers with Down's syndrome.* In: *Down syndrome Research and Practice, 1* (2), 63 – 71.

9. Buckley, S. (1999): *Improving the expressive language skills of teenagers with Down's syndrome.* In: *Down syndrome Research and Practice*, 3 (3), 110 – 115.

10. Buckley, S. (2000): *El desarrollo cognitivo de los niños con síndrome de Down: consecuencias prácticas de las recientes investigaciones psicológicas*. En: J. Rondal, J. Perera y L. Nadel (coordinadores). *Síndrome de Down: revisión de los últimos conocimientos*. Madrid: España.

11. Buckley, S. (2001): *Reading and writing for individuals with Down syndrome – An overwie*. The Down syndrome Educational Trust, Hampshire, United Kingdom.

12. Buckley, S.; Bird, G. (1993): *Teaching children with Down syndrome to read.* In: *Down syndrome Research and Practice,* Volume 1 Issue 1.

13. Buckley, S.; Emslie, M.; Haslegrave, G and LevPrevost, P. (1986): *The Development of Language and Reading Skills in Children with Down's syndrome.* Portsmouth Polytechnic.

14. Byrne, A.; Buckley, S.; MacDonald, J. & Bird, G. (1995): *Investigating the literacy, language and memory skills of children with Down's syndrome.* In: *Down syndrome Research and Practice* 3 (2), 53-58.

15. Byrne, A.; MacDonald, J. & Buckley, S. (2002): *Reading, language and memory skills: a comparative longitudinal study of children with Down syndrome and their mainstream peers*. In: *British Journal of Educational Psychology*, Dec; 72, pp. 513 - 529.

16. Comblain, A. (1994): Working *memory in Down's syndrome: training the rehearsal strategy*. In: *Down syndrome Research and Practice* 2 (3), 123-126.

17. Conners, F. (1992): *Reading Instruction for Students with Moderate Mental Retardation: Review and Analysis of Research.* In: *American Journal on Mental Retardation* Vol. 96, No. 6, 577–597.

18. Conners, F.A.; Rosenquist, C.J. & Taylor, L.A. (2001b): *Memory training for children with Down syndrome.* In: *Down syndrome Research and Practice,* 7 (1), 25 – 33.

19. Cossu, G.; Rossini, F. & Marshall, J.C. (1993): *When reading is acquired but phonemic awareness is not: a study of literacy in Down's syndrome.* In: *Cognition,* 46, 129 – 138.

20. Cupples, L.; Iacono, T. (2000): *Phonological Awareness and Oral Skill in Children with Down syndrome*.

In: *Journal of Speech, Language and Hearing Research*, June, 43, 595 – 608.

21. Chapman, R. S.; Seung, H.K.; Schwartz, S. & Kay-Raining, E. (1998): *Language skills of children and adolescents with Down syndrome: II. Production Deficits*. In: Journal *of Speech, Language and Hearing Research* 41, August, 861-873.

22. Fletcher, H. Buckley, S. (2002): *Phonological awareness in children with Down Syndrome*. In: *Down syndrome Research and Practice*, 8 (1), 11 - 18.

23. Foreman, P.; Crews, G. (1998): *Using augmentative communication with infants and young children with Down syndrome*. In: *Down Syndrome Research and Practice*, Volume 5 Issue 1.

24. Iacono, T.A. (1998): *Analysis of the Phonological Skills of Children with Down-Syndrome from single word and connected Speech samples.* In: *International Journal of Disability, Development and Education*, Vol. 45, No. 1, 57 - 73.

25. Jarrold, Ch. & Baddeley, A. (2001): *Short-term Memory in Down's syndrome: applying the working memory model*. In: *Down syndrome Research and Practice* 7 (1), 17-23.

26. Jarrold, Ch.; Baddeley, A.D. & Phillips, C. (1999): *Down syndrome and the phonological loop: the evidence for, and importance of, a specific verbal short-term memory deficit.* In: *Down syndrome Research and Practice* 6(2), 61 – 75.

27. Kay-Raining Bird, E., Clave, P. & McConnell, L. (2000): *Reading and Phonological Awareness in Children with Down syndrome: a Longitudinal Study*. In: *American Journal of Speech and Language Pathology*, Vol. 9, No. 4, Nov., pp. 319 - 330.

28. Kennedy, E. J.; Flynn, M. C. (2003): *Early phonological awareness and reading skills in children with Down syndrome.* In: *Down syndrome Research and Practice*, 8 (3), 100 - 109.

29. Kroeger, K.A. Nelson, W.M. (2006): *A language programme to increase the verbal production of a child dually diagnosed with Down syndrome and autism*. In: *Journal of Intellectual Disability Research*, Vol. 50, No. 2 (Feb., 2006) pp. 101 - 108.

30. Laws, G.; MacDonald, J. & Buckley, S. (1996): *The effects of a short training in the use of a rehearsal strategy on memory for words and pictures in children with Down's syndrome.* In: *Down syndrome Research and Practice* 4(2), 70 – 78.

31. Laws, G.; Buckley, S.; Bird, G.; MacDonald, J. & Broadley, I. (1995): *The influence of reading instruction on language and memory development in children with Down's syndrome*. In: *Down syndrome Research and Practice* 3 (2), 59-64.

32. Laws, G.; MacDonald, J. Buckley, S. & Broadley, I. (1995): *Long-term maintenance of memory skills taught to children with Down's syndrome.* In: *Down syndrome Research and Practice* 3 (3), 103-109.

33. Marcell, M. & Weeks, S. L. (1988): *Short-term memory difficulties and Down's syndrome.* In: *Journal of mental deficiency research*, 32, 153 - 162.

34. Mundy, P.; Sigman, M.; Kasari, C. & Yirmiya, N. (1988): *Nonverbal Communication Skills in Down Syndrome Children*. In: *Child Development*, Vol. 59, No. 1, Feb., pp. 235 - 249.

35. Nadel, L. (1999): *Learning and memory in Down syndrome*. In: Rondal, J.; Perera, J. & Nadel, L. (Hrgs.): *Down-Syndrome: a Review of Current Knowledge.* Whurr Publishers, England.

36. Oelwein, P. (1998): *Kinder mit Down-Syndrom lernen lessen: ein Paxisbuch für Eltern und Lehrer*. Zirndorf: G & S Verlag.

37. Ryka, E. (1994): *Phonological awareness in children with Down's syndrome*. In: *Down syndrome Research and Practice* 2(3), 102 – 105.

38. Stoel-Gammon, C. (2001): *Down syndrome phonology: developmental patterns and intervention strategies*. In: *Down syndrome Research and Practice* 6(2), 61 – 75.

39. Troncoso, M.V.; Del Cerro, M. (1991): *Lectura y escritura de los niños con síndrome de Down*. En Flórez, J. & Troncoso, M.V., Eds. Síndrome de Down y Educación. Masson y Fundación Síndrome de Down de Cantabria, Barcelona, pp. 89-122.

40. Verucci, L.; Menghini, D. & Vicari, S. (2006): *Reading skills and phonological awareness acquisition in Down syndrome*. In: *Journal of Intellectual Disability Research*, Vol. 50, No. 7, July, pp. 477 - 491.